

SEC.626

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A1

structure; and

annealing the resulting structure.

Claim 7. (Amended) A method for depositing a hemispherical grain layer over a conductive layer pattern of a capacitor electrode on a substrate in an ambient for forming a semiconductor capacitor, the method comprising:

introducing a first amount of a source gas into the ambient, while heating the ambient, to form a first plurality of hemispherical sections while a temperature of the substrate [stabilizes] is stabilizing within a first temperature range;

introducing a second amount of the source gas into the ambient to form a second plurality of hemispherical sections over the first plurality of hemispherical sections after the temperature of the substrate stabilizes within the first temperature range to form a resulting structure; and

annealing the resulting structure.

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14. A method for forming a capacitor electrode of a capacitor in a reacting chamber, the method comprising:

forming a first HSG nuclei by introducing a first source gas into the reacting chamber during a period while an ambient temperature [stabilizes] is stabilizing at a first temperature range;

forming a second HSG nuclei over the first HSG nuclei by introducing a second source gas into the reacting chamber after the [period while an] ambient temperature stabilizes at [a] the first temperature range to form a resulting structure; and

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annealing the resulting structure.

Please add the following new claims:

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--Claim 16. The method according to claim 7, further comprising pre-heating the first amount of source gas to about 35°C prior to introducing the first amount of source gas into the ambient.--

BS
--Claim 17. The method according to claim 16, wherein the ambient is heated to a temperature between 200°C and 500°C.--

Remarks

The Office Action of September 13, 1999 and the references cited therein have been carefully studied and reviewed, and in view of the foregoing amendments and following remarks, reconsideration is respectfully requested. Claims 1, 7 and 14 have been amended and new claims 16 and 17 have been added. Claims 1-17 are thus pending in the application. No new matter has been added.

The present invention offers an improvement in the method of forming hemispherical polycrystalline grains on a conductive layer used as a capacitor electrode. Such hemispherical grains increase the surface area of the electrode and hence, allow the capacitor to provide a relatively large capacitance per unit area.

Prior art methods of forming such hemispherical grains (HSG) offer a compromise between production time and grain size. HSGs formed in a cold reaction chamber have a relatively large average size but take a long time to